Figure 220: Reference operator for a range

Table 8: Reference range operator examples

Example	Description
A2:B4	Reference to a rectangle range with 6 cells, 2 column width × 3 row height. When you click on the reference in the formula in the input line, a border indicates the rectangle.
(A2:B4):C9	Reference to a rectangle range with cell A2 top left and cell C9 bottom right. So the range contains 24 cells, 3 column width × 8 row height. This method of addressing extends the initial range from A2:B4 to A2:C9.
Sheet1.A3:Sheet3.D4	Reference to a cuboid range with 24 cells, 4 column width × 2 row height × 3 sheets depth. (Assumes that sheets *Sheet1*, *Sheet2*, and *Sheet3* appear in that order on the Sheet tabs area.)
B:B	Reference to all cells of column B.
A:D	Reference to all cells of columns A to D.
20:20	Reference to all cells of row 20.
1:20	Reference to all cell of rows 1 to 20.

When you enter B4:A2, B2:A4, or A4:B2 directly, then Calc will turn it to A2:B4. So the left top cell of the range is left of the colon and the bottom right cell is right of the colon. But if you name the cell B4 for example with _start and A2 with _end, you can use _start:_end without any error.

Reference concatenation operator

The concatenation operator is written as a tilde. An expression using the concatenation operator has the following syntax:

```
reference left ~ reference right
```

The result of such an expression is a reference list, which is an ordered list of references. Some functions can take a reference list as an argument, SUM, MAX, or INDEX for example.

The reference concatenation is sometimes called 'union'. But it is not the union of the two sets 'reference left' and 'reference right' as normally understood in set theory. `COUNT(A1:C3~B2:D2)` returns 12 (=9+3), but it has only 10 cells when considered as the union of the two sets of cells.

Notice that `SUM(A1:C3,B2:D2)` is different from `SUM(A1:C3~B2:D2)` although they give the same result. The first is a function call with 2 parameters, each of them is reference to a range. The second is a function call with 1 parameter, which is a reference list.